Complete Summary

GUIDELINE TITLE

Practice parameter: electrodiagnostic studies in carpal tunnel syndrome.

BIBLIOGRAPHIC SOURCE(S)

American Association of Electrodiagnostic Medicine, American Academy of Neurology, American Academy of Physical Medicine and Rehabilitation. Practice parameter for electrodiagnostic studies in carpal tunnel syndrome: summary statement. Muscle Nerve 2002 June;25:918-22. [6 references]

Jablecki CK, Andary MT, Floeter MK, Miller RG, Quartly CA, Vennix MJ, Wilson JR. Practice parameter: Electrodiagnostic studies in carpal tunnel syndrome: Report of the American Association of Electrodiagnostic Medicine, American Academy of Neurology, and the American Academy of Physical Medicine and Rehabilitation. Neurology 2002 Jun 11;58(11):1589-92. [6 references] PubMed

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

Carpal tunnel syndrome (CTS)

GUIDELINE CATEGORY

Diagnosis
Technology Assessment

CLINICAL SPECIALTY

Neurology
Physical Medicine and Rehabilitation

INTENDED USERS

Physicians

GUIDELINE OBJECTIVE(S)

To define the standards, guidelines, and options for electrodiagnostic (EDX) studies of carpal tunnel syndrome (CTS) based on a critical review of the literature

TARGET POPULATION

Patients suspected of having carpal tunnel syndrome (CTS) on clinical grounds (history and physical examination)

INTERVENTIONS AND PRACTICES CONSIDERED

1. Sensory and motor conduction studies of the median nerve
2. Electromyography of a sample of muscles innervated by the C5 to T1 spinal roots

MAJOR OUTCOMES CONSIDERED

- Confirmation of the diagnosis of carpal tunnel syndrome
- Diagnostic performance characteristics of nerve conduction and electromyographic studies (i.e., sensitivity and specificity)

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Primary Sources)
Hand-searches of Published Literature (Secondary Sources)
Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

The source of the articles for the first literature review published in 1993 was a Medline search for literature in English from January 1, 1986 through May 1991. The Medical Subject Headings (MeSH) searched were 1) wrist injuries or wrist joint, 2) nerve compression syndrome, and 3) carpal tunnel syndrome. The search identified 488 articles. Based on a review of the abstracts, 81 articles describing electrodiagnostic (EDX) studies were chosen for review. An additional 78 reports were identified from the bibliographies of these 81 articles and American Academy of Electrodiagnostic Medicine (AAEM) consultants recommended six others. All 165 articles were then reviewed in their entirety.

The source of the articles for the second literature review was a Medline for literature in English through December 2000. The MeSH searched were 1) carpal tunnel syndrome and diagnosis or 2) carpal tunnel and neural conduction. The

search generated 497 article titles with abstracts published since 1990. Based on a review of the abstracts, the guideline task force chose 92 articles for review. An additional 5 articles were identified from the bibliographies of the articles and 16 from AAEM members who have current research interests in carpal tunnel syndrome. A total of 113 articles were then reviewed.

The guideline task force used the following AAEM carpal tunnel syndrome literature inclusion criteria to review the 278 articles identified in the literature search.

Literature Inclusion Criteria

1. Prospective study design.
2. Diagnosis of carpal tunnel syndrome (CTS) in patient population based on clinical criteria independent of the electrodiagnostic procedure under evaluation.
3. EDX procedure described in sufficient detail to permit replication of the procedure.
4. Limb temperature monitored (measured continuously) during nerve conduction procedures and minimum (or range) of limb temperatures reported for both carpal tunnel syndrome patients and the reference population.
5. Reference values for the electrodiagnostic test:
    a. Obtained either with concomitant studies of a reference population, or
    b. Obtained with previous but identical studies of a reference population in the same laboratory
6. Criteria for abnormal findings clearly stated and, if the measurement is a quantitative one, the abnormal value is defined in statistically computed terms, e.g., range and mean ±2 standard deviations, from data derived from the reference population.

A total of 22 of the 278 articles reviewed met all six literature inclusion criteria. There were nine additional articles (eight using surface electrodes and one using needle electrodes) that studied median motor and sensory nerve conduction across the carpal tunnel (amplitude, latency, and velocity) in normal subjects only and otherwise fulfilled the literature inclusion criteria.

NUMBER OF SOURCE DOCUMENTS

165 source documents were identified for the first literature review. An additional 113 articles were identified for the second literature review.

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Expert Consensus

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not applicable

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Tables were constructed to display the data from the articles that met all six American Association of Electrodiagnostic Medicine´s (AAEM) carpal tunnel syndrome (CTS) literature inclusion criteria (LIC) unless the studies used subdermal (needle) stimulating and/or recording electrodes for the nerve conduction study (NSC) or the studies were considered investigational. Abstracts of articles that met 4, 5, or 6 AAEM CTS literature inclusion criteria or had historical interest were not included in the references. The information included in the tables describing the results of details of nerve conduction studies with surface recording and stimulating electrodes. A table comparing pooled sensitivities and specificities of electrodiagnostic (EDX) techniques to diagnosis CTS and the specific studies pooled are provided in the second CTS literature review (see "Companion Documents").

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Not stated

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

The strength of a recommendation or conclusion is based on the quality and consistency of supporting evidence as well as the magnitudes of benefits, risks and costs. The following rating system is used:

1. Practice standards: generally accepted principles for patient management that reflect a high degree of clinical certainty.
2. Practice guidelines: recommendations for patient management that reflect moderate clinical certainty.
3. Practice options: other strategies for patient management for which the clinical utility is uncertain.

COST ANALYSIS

A systematic evaluation of the economic costs and economic benefits of nerve conduction studies (NCS) and needle electromyography (EMG) was not undertaken; however the guideline developer refers the reader to an outcome study which demonstrated that NCS/EMG studies were useful and cost effective in the management of patients suspected of carpal tunnel syndrome (CTS). See the original guideline document for the relevant citation.

METHOD OF GUIDELINE VALIDATION

Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

These guideline recommendations were reviewed by the Boards of Directors of the American Academy of Neurology, the American Academy of Physical Medicine and Rehabilitation, and the American Association of Electrodiagnostic Medicine.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

The recommendations below are identical to those made and endorsed in 1993 by the American Academy of Neurology, the American Academy of Physical Medicine and Rehabilitation and the American Association of Electrodiagnostic Medicine with the clarification of recommendation 1 and 2a and the addition of 2c based on new evidence reviewed in the second carpal tunnel syndrome (CTS) literature review.

Each recommendation has been classified as a standard, guideline or option according to the definitions given at the end of the "Major Recommendations" field.

In patients with suspected CTS, the following electrodiagnostic (EDX) studies are recommended (see the Table 1 in the original guideline document for sensitivity and specificity of Techniques A through K, see the definitions at the end of the "Major Recommendations" field for a description of Techniques A through K):

1. Perform a median sensory nerve conduction study (NCS) across the wrist with a conduction distance of 13 to 14 cm (Technique G). If the result is abnormal, comparison of the result of the median sensory NCS to the result of a sensory NCS of one other adjacent sensory nerve in the symptomatic limb (Standard).
2. If the initial median sensory NCS across the wrist has a conduction distance greater than 8 cm and the result is normal, one of the following additional studies is recommended:
    a. Comparison of median sensory or mixed nerve conduction across the wrist over a short (7 to 8 cm) conduction distance (Technique C) with ulnar sensory nerve conduction across the wrist over the same short (7 to 8 cm) conduction distance (Technique D) (Standard), or
    b. Comparison of median sensory conduction across the wrist with radial or ulnar sensory conduction across the wrist in the same limb (Techniques B and F) (Standard), or
    c. Comparison of median sensory or mixed nerve conduction through the carpal tunnel to sensory or mixed NCS of proximal (forearm) or distal (digit) segments of the median nerve in the same limb (Technique A) (Standard).
3. Motor conduction studies of the median nerve recording from the thenar muscle (Technique H) and of one other nerve in the symptomatic limb to include measurement of distal latency (Guideline).
4. Supplementary NCS: Comparison of the median motor nerve distal latency (second lumbrical) to the ulnar motor nerve distal latency (second interossei) (Technique J), median motor terminal latency index (Technique I), median motor nerve conduction between wrist and palm (Technique E), median motor nerve compound muscle action potential (CMAP) wrist to palm amplitude ratio to detect conduction block, median sensory nerve action potential (SNAP)

wrist to palm amplitude ratio to detect conduction block, short segment (1 cm) incremental median sensory nerve conduction across the carpal tunnel (Option).
5. Needle electromyography of a sample of muscles innervated by the C5 to T1 spinal roots, including a thenar muscle innervated by the median nerve of the symptomatic limb (Option).

Based on the second CTS literature review, the following EDX studies are not recommended to confirm a clinical diagnosis of CTS either because the EDX studies recommended above have greater sensitivity and specificity or the test is best described as investigational at this time.

1. Low sensitivity and specificity compared to other EDX studies: multiple median F wave parameters, median motor nerve residual latency, and sympathetic skin response (Technique K).
2. Investigational studies: evaluation of the effect on median NCS of limb ischemia, dynamic hand exercises, and brief or sustained wrist positioning.

Definitions:

Practice Recommendation Strengths

The strength of a recommendation or conclusion is based on the quality and consistency of supporting evidence as well as the magnitudes of benefits, risks and costs. The following rating system is used:

1. Practice standards: generally accepted principles for patient management that reflect a high degree of clinical certainty.
2. Practice guidelines: recommendations for patient management that reflect moderate clinical certainty.
3. Practice options: other strategies for patient management for which the clinical utility is uncertain.

Description of Electrodiagnostic Techniques

Technique A. Median sensory and mixed nerve conduction: wrist and palm segment compared with forearm or digit segment

Technique B. Comparison of median and ulnar sensory conduction between wrist and ring finger

Technique C. Median sensory and mixed nerve conduction between wrist and palm

Technique D. Comparison of median and ulnar mixed nerve conduction between wrist and palm

Technique E. Median motor nerve conduction between wrist and palm

Technique F. Comparison of median and radial sensory conduction between wrist and thumb

Technique G. Median sensory nerve conduction between wrist and digit

Technique H. Median motor nerve distal latency

Technique I. Median motor nerve terminal latency index

Technique J. Comparison of median motor nerve distal latency (second lumbrical) to the ulnar motor nerve distal latency (second interossei)

Technique K. Sympathetic skin response

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The recommendations are based on a critical review of the literature. The type of supporting evidence is incorporated into the strength of each practice recommendation (see "Major Recommendations" above).

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Effective utilization of nerve conduction and electromyographic studies when laboratory confirmation is desired in patients suspected of having carpal tunnel syndrome (CTS) on clinical grounds (history and physical examination). The first and second literature reviews provide convincing scientific evidence that median sensory and motor nerve conduction studies (NCSs): (1) are valid and reproducible clinical laboratory studies; (2) confirm a clinical diagnosis of CTS with a high degree of sensitivity (<85%) and specificity (>95%).

POTENTIAL HARMS

Not stated

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

This statement is provided as an educational service of the American Association of Electrodiagnostic Medicine (AAEM), the American Academy of Neurology (AAN) and the American Academy of Physical Medicine and Rehabilitation (AAPM&R). It is based on an assessment of the current scientific and clinical information. It is not intended to include all possible methods of care for a particular clinical problem, or all legitimate criteria for choosing to use a specific procedure. Neither

is it intended to exclude any reasonable alternative methodologies. The American Association of Electrodiagnostic Medicine recognize that specific patient care decisions are the prerogative of the patient and his/her physician and are based on all the circumstances involved.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

American Association of Electrodiagnostic Medicine, American Academy of Neurology, American Academy of Physical Medicine and Rehabilitation. Practice parameter for electrodiagnostic studies in carpal tunnel syndrome: summary statement. Muscle Nerve 2002 June;25:918-22. [6 references]

Jablecki CK, Andary MT, Floeter MK, Miller RG, Quartly CA, Vennix MJ, Wilson JR. Practice parameter: Electrodiagnostic studies in carpal tunnel syndrome: Report of the American Association of Electrodiagnostic Medicine, American Academy of Neurology, and the American Academy of Physical Medicine and Rehabilitation. Neurology 2002 Jun 11;58(11):1589-92. [6 references] PubMed

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

1993 Oct (revised 2002)

GUIDELINE DEVELOPER(S)

American Academy of Neurology - Medical Specialty Society
American Academy of Physical Medicine and Rehabilitation - Medical Specialty

Society
American Association of Electrodiagnostic Medicine - Medical Specialty Society

SOURCE(S) OF FUNDING

Not stated

GUIDELINE COMMITTEE

American Association of Electrodiagnostic Medicine (AAEM) Carpal Tunnel Syndrome Task Force
American Academy of Neurology (AAN) Quality Standards Subcommittee
American Academy of Physical Medicine and Rehabilitation (AAPM&R) Practice Guidelines Committee

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

American Association of Electrodiagnostic Medicine (AAEM) 2001 Carpal Tunnel Syndrome Task force members: Charles K. Jablecki, MD (Chair); Michael T. Andary, MD, MS; Mary Kay Floeter, MD, PhD; Robert G. Miller, MD; Caroline A. Quartly, MD, FRCP(C); Michael J. Vennix, MD; and John R. Wilson, MD.

American Academy of Neurology (AAN) Quality Standards Subcommittee members: Gary M. Franklin, MD (Co-Chair); Catherine A. Zahn, MD, FRCP(C), MHSc (Co-Chair); Milton Alter, MD, PhD; Stephen Ashwal, MD; Rose M. Dotson, MD; Richard M. Dubinsky, MD; Jacqueline French, MD; Gary H. Friday, MD; Michael Glantz, MD; Gary S. Gronseth, MD; Deborah Hirtz, MD; James Stevens, MD; David J. Thurman, MD, MPH; and William Weiner, MD.

American Academy of Physical Medicine and Rehabilitation (AAPM&R) Practice Guidelines Committee members: John C. Cianca, MD; Gerard E. Francisco, MD; Thomas L. Hedge, Jr., MD; Deanna M. Janora, MD; Ajay Kumar, MD; Gerard A. Malanga, MD; Jay M. Meythaler, MD, JD; Frank J. Salvi, MD; and Richard D. Zorowitz, MD.

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previously released version (Neurology 1993 Nov;43[11]:2404-5; Muscle Nerve 1993 Dec;16[12]:1390-1).

GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the American Academy of Neurology (AAN) Web site.

Print copies: Available from AAN Member Services Center, (800) 879-1960, or from AAN, 1080 Montreal Avenue, St. Paul, MN 55116.

This guideline is also available for purchase from the American Association of Electrodiagnostic Medicine (AAEM). To obtain an order form, please contact the Education Department at the AAEM Executive Office, 421 First Ave SW, Suite 300 E, Rochester, MN 55902; (507) 288-0100; fax, (507) 288-1225; e-mail: aaem@aaem.net. The order form is also posted on the AAEM Web site.

AVAILABILITY OF COMPANION DOCUMENTS

The following is available:

- Jablecki CK, Andary MT, Floeter MK, Miller RG, Quartly CA, Vennix MJ, Wilson JR. Second AAEM literature review of the usefulness of nerve conduction studies and needle electromyography for the evaluation of patients with carpal tunnel syndrome. AAEM Quality Assurance Committee. Muscle Nerve (In press).

Print copies: Available for purchase from the American Association of Electrodiagnostic Medicine (AAEM). To obtain an order form, please contact the Education Department at the AAEM Executive Office, 421 First Ave SW, Suite 300 E, Rochester, MN 55902; (507) 288-0100; fax, (507) 288-1225; e-mail: aaem@aaem.net. The order form is also posted on the AAEM Web site.

PATIENT RESOURCES

None available

NGC STATUS

This summary was completed by ECRI on October 1, 1998. The information was verified by the American Academy of Neurology as of January 15, 1999. This summary was updated on August 21, 2002. The information was verified by the guideline developer on September 23, 2002.

COPYRIGHT STATEMENT

Date Modified: 11/8/2004


FIRSTGOV